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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/898,162	07/03/2001	Amit Anil Nanavati	JP920010141US1	2569

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EXAMINER	
NGUYEN, STEVEN H D	
ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/898,162	NANAVATI ET AL.	
	Examiner	Art Unit	
	Steven HD Nguyen	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 22-42 rejected under 35 U.S.C. 103(a) as being unpatentable over Salonidis (USP 6865371) in view of Johansson (US 2002/0044549) and Chatterjee (IEEE).

Regarding claims 22, 26, 28, 30, 34, 36, 38 and 42, Salonidis discloses a method for optimal clustering of master-slave ad-hoc wireless network, said method comprising assigning any of master and slave status to each node and connecting slave nodes in said wireless network to master nodes in said wireless network to form subgroups comprising a bounded size; interconnecting said subgroups through non-center nodes in said wireless network to form a single cluster using any of connecting a slave node at the boundary of one subgroup to the master of an adjacent subgroup; connecting two adjacent master nodes together; and converting a slave node at said boundary to a master node and linking the converted node to any of slave nodes and master nodes in adjacent subgroups; minimizing the number of master nodes in said wireless network by the interconnection of said subgroups based on said defined optimization parameters (Col. 12, lines 10-50, phase I, the coordinator node has a view of the nodes in the network being similar to star network because bluetooth a star shaped network, Phase II assigning status to the nodes in the network such as master, bridge or salve based on the constraints, Phase III connects the master to slaves, master-slave-master, master-master of the piconet in order form a single

scatternet, Col. 13, line 65 to col. 14, lines 10) and said star-shaped graphical format, an edge between a pair of said nodes in said wireless network occurs if said pair of nodes are in radio range of each other. and wherein said each node discovers other nodes within said radio range in said wireless network using device discovery protocols (col. 4, lines 10-23, the node use discovery protocol to from a star shaped). However, Salonidis fails to fully disclose the connected network. In the same field of endeavor, Johansson discloses a method and system for optimal clustering of master-slave ad-hoc wireless network comprising interconnecting said subgroups to form a single cluster either by connecting a slave node at the boundary of one subgroup to the master of an adjacent subgroup where possible (slave 720 in piconet 1 to the master M2 in piconet 2 in fig. 7), or by connecting two adjacent master nodes together (Master M2 in piconet 2 to the master M3 in piconet 3 in fig. 7) or by converting a slave node (M4 was a slave in piconet 2 but master in TS1) to at the boundary to a master and linking it to the slave nodes or master nodes in the adjacent subgroups (M4 to M2) and said star-shaped graphical format, an edge between a pair of said nodes in said wireless network occurs if said pair of nodes are in radio range of each other. and wherein said each node discovers other nodes within said radio range in said wireless network using device discovery protocols (page 2, [0013], discovery feature allows a node to hear the other nodes within its range). Since, Johansson suggests a well-known method with centralized mechanism for forming a maximum Connectivity Scatternet (subgroup) has been used ([0068]) and Salonidis suggests the piconets coupled by the bridge node to form a scatternet. However, Johansson and Salonidis differs from the claimed invention in that the modified assembly does not specifically teach that modeling all nodes in said wireless network in a star-shaped graphical format; assigning a weight to said all nodes, wherein said

weight is a function of defined optimization parameters comprising an amount of neighbor nodes of each said node, a power consumption of said node, and a maintenance overhead associated with said node; updating said weight of said all nodes at each occurrence of a removal of an edge of each node marked as any of said master node and said slave node. In the same field of endeavor, Chatterjee discloses modeling all nodes in said wireless network in a star-shaped graphical format (Page 1698, Sec 2); assigning a weight to said all nodes, wherein said weight is a function of defined optimization parameters comprising an amount of neighbor nodes of each said node, a power consumption of said node, and a maintenance overhead associated with said node (Pages 1698-1700, Sec III, assigning a weight for each node based on the number of nodes, power and mobility "overhead" and selecting the clusterheads based on these values in order to minimize the number of clusterhead nodes in the network); updating said weight of said all nodes at each occurrence of a removal of an edge of each node marked as any of said master node and said slave node (Page 1701, Sec V) and minimizing the number of master nodes in said wireless network by the interconnection of said subgroups based on said defined optimization parameters (Pages 1698-1700, Sec III) and said star-shaped graphical format, an edge between a pair of said nodes in said wireless network occurs if said pair of nodes are in radio range of each other. and wherein said each node discovers other nodes within said radio range in said wireless network using device discovery protocols (Page 1698, Sec II, the nodes in the graph can hear each other because its is within transmission range).

Since, Salonidis suggests a method and system for using the criteria of nodes when forming the scatternet. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a method for using the constraints to select a

minimum number of the clusterhead nodes and updating these constrains when a node move out of the reach of the network as disclosed by Chatterjee in to the teaching of Johansson which discloses a well known method for forming a scatternet by connecting the nodes of the piconets into the teaching of Salonidis. The motivation would have been to improve throughput and reduce the latency.

Regarding claims 23, 31 and 39, Salonidis further discloses that each node is assigned master or slave based on the degree of connectivity of said node with other unassigned nodes (col.4 lines 14-23).

Regarding claims 24, 32 and 40, Salonidis further teaches the assignment is implemented by a single entity (the "coordinator") located either within the cluster as one of the nodes (as a "master" when one piconet is formed; col. 12 lines 7-10) or outside the cluster (outside the piconet when the coordinator assigns a node as another master to form a new piconet; col. 12 lines 11-17).

Regarding claims 25 and 33, although the assembly of Johansson, Salonidis and Chatterjee do not specifically points out that the formation of clusters and interconnection between the said clusters is based on weight associated with each node in the network where the weight of a node depends upon the number of nodes in its neighborhood, however Johansson and Salonidis both disclose the neighbor nodes inquiring ([0013] in Johansson and col. 1 lines 58-60 in Salonidis). Specifically, Johansson teaches that ad-hoc networks are dynamic, ad-hoc networking technology typically has a neighbor discovery feature. The neighbor discovery feature allows one node to find any other node within radio range with which the first node can communicate with and consequently form an ad-hoc network with ([0013]). Further more,

Johansson teaches that scatternets should be formed by maximum connectivity, i.e. maximum connectivity scatternet (MCS) ([0024]). It would have been obvious for one of ordinary skill in the art to understand that the "maximum connectivity" depends on the number of neighboring nodes, for example, the nodes with the largest number of neighbors should serve as masters. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate the formation of clusters and interconnection between the said clusters based on weight associated with each node in the network where the weight of a node depends upon the number of nodes in its neighborhood in the assembly of Johansson, Salonidis and Chatterjee in order to identify the nodes and form efficient scatternets.

Regarding claims 27, 35 and 41, Johansson further disclose a method/system with a distributed manner at each node further comprising: assigning master or slave status to itself by each node based on the master or slave or unassigned status of all neighboring connected nodes (figs. 9A-9C and the corresponding descriptions), forming subgroups around each master node (figs. 9A-9C and the corresponding descriptions), merging said subgroups by forming slave-slave bridges (slave S2 in piconet 1 to the slave D2 in piconet 2 in fig. 7) or slave-master bridges (slave 720 in piconet 1 to the master M2 in piconet 2 in fig. 7) or master-master bridges (Master M2 in piconet 2 to the master M3 in piconet 3 in fig. 7) wherever possible based on network constraints or by forming additional masters where necessary.

Regarding claim 29 and 37, Chatterjee discloses minimizing the number of communication hops in said wireless network based on the minimal number of master nodes in said wireless network (Page 1698, Sec III, minimum number of clusterhead implies a minimum number of hops).

Conclusion

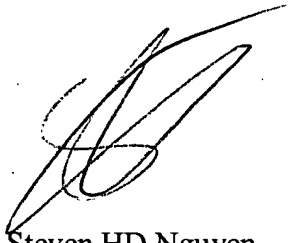
3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven HD Nguyen whose telephone number is (571) 272-3159. The examiner can normally be reached on 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wellington Chin can be reached on (571) 272-3134. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Steven HD Nguyen
Primary Examiner
Art Unit 2616
November 3, 2006